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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/987,437	11/14/2001	W. Don Morison	115354.00107	6763

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EXAMINER

LYONS, MICHAEL A

ART UNIT PAPER NUMBER

2877

DATE MAILED: 02/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

09/987,437

Applicant(s)

MORISON ET AL.

Examiner

Michael A. Lyons

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-54 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-5, 7-29, 31-51, 53 and 54 is/are rejected.
- 7) ☒ Claim(s) 6, 30 and 52 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 28 January 2002 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- ☐ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_.
- ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: \_\_\_\_.

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## **DETAILED ACTION**

### ***Response to Amendment***

Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

### ***Drawings***

This application, filed under former 37 CFR 1.60, lacks formal drawings. The informal drawings filed in this application are acceptable for examination purposes. When the application is allowed, applicant will be required to submit new formal drawings. In unusual circumstances, the formal drawings from the abandoned parent application may be transferred by the grant of a petition under 37 CFR 1.182.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 1-5, 7-29, 31-51, and 53-54 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sorin et al (5,557,400) in view of Swanson et al (5,459,570).**

Regarding claim 25, Sorin (Fig. 1 and 3) discloses a source of light 20, a first optical path 22 with an optical fiber whose path length that changes in response to a physical condition, a second optical path 33, a first coupler 21, a photodetector 36, and analyzer 329 as a computer system receiving signals from the photodetector. Sorin, however, fails to disclose the use of an

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actuator to change the second optical path by physically changing the length of the fiber representing the second path.

Swanson (Fig. 1 and 2) discloses a device whereby the path length of the paths in the apparatus can be changed in two ways. In Fig. 2, actuator 39 controls the movement of mirror 32 in the reference arm to change the path length; the changing of the path lengths in the reference arm rather than the measurement arm will generate the same results. This is identical to the use of mirror 34 in Sorin to change the path length of the second optical path 33. Additionally, Swanson discloses the use of PZT 40 as an actuator to physically change the length of optical fiber 26 during measurement to change the path length of the measuring arm. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the PZT in the optical fiber of Swanson for the mirror as actuator of Sorin to facilitate the change of the optical path length of the measuring arm.

Regarding claim 1, while Sorin fails to disclose the claimed method, the device as described above with regards to claim 25 does disclose the claimed elements of the system. Therefore, the claimed method of use is inherent in the disclosed system.

As for claims 2 and 26, the PZT of Swanson changes the path length in response to an electrical signal from the PZT.

As for claims 3 and 27, Sorin discloses a short coherence length interferometer.

As for claims 4-5, 7, 28-29, and 31, Swanson's device uses a PZT to change the path length of the fiber.

As for claims 8 and 32, fiber 32 of Sorin has a fixed length.

As for claims 9 and 33, the second optical path of Sorin comprises the first fiber.

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As for claims 10 and 34, coupler 21 of Sorin passes the light as claimed.

As for claims 11 and 35, the device of Sorin includes a second coupler 31, wherein both of the couplers pass the light through as claimed. In addition, the first fiber comprises mirrors 11, 12, 13, 14, and 15.

As for claims 12 and 36, the second and third fibers of Sorin include mirrors 34 and 37, with the second coupler passing light as claimed.

As for claims 13 and 37, mirror 11 of Sorin is a partial mirror.

As for claims 14 and 38, Official Notice is taken as to the common practice of using interference fringe maximums for particular measurements in interferometry.

As for claims 15-17 and 39-41, the location of the fiber is a matter of design choice, as the adjustment of the location of the fiber will have no impact on the functionality of the device.

As for claims 18-22 and 42-46, the fiber of Sorin responds to the physical condition by changing its length.

As for claims 23 and 47, fiber 22 of Sorin changes length in response to a physical condition.

As for claims 24 and 48, Swanson discloses the use of single-mode fibers.

Regarding claim 49, Sorin (Fig. 1 and 3) discloses a source of light 20, a first optical path 22 with an optical fiber whose path length that changes in response to a physical condition, a second optical path 33, a first coupler 21, a photodetector 36, and analyzer 329 as a computer system receiving signals from the photodetector. Sorin, however, fails to disclose the use of an actuator to change the second optical path by physically changing the length of the fiber representing the second path.

Swanson (Fig. 1 and 2) discloses a device whereby the path length of the paths in the apparatus can be changed in two ways. In Fig. 2, actuator 39 controls the movement of mirror 32 in the reference arm to change the path length; the changing of the path lengths in the reference arm rather than the measurement arm will generate the same results. This is identical to the use of mirror 34 in Sorin to change the path length of the second optical path 33. Additionally, Swanson discloses the use of PZT 40 as an actuator to physically change the length of optical fiber 26 during measurement to change the path length of the measuring arm. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the PZT in the optical fiber of Swanson for the mirror as actuator of Sorin to facilitate the change of the optical path length of the measuring arm.

As for claims 50-51 and 53, Swanson's device uses a PZT as an actuator to change the length of the optical fiber.

As for claim 54, Sorin discloses a short coherence length interferometer.

### ***Response to Arguments***

Applicants' arguments filed 6 February 2004 have been fully considered but they are not persuasive. The applicants argue that the PZT in the Swanson patent only serves to generate a modulation of the optical signal in the device. This modulation is achieved by "introducing sinusoidal phase modulation by use of the piezoelectric transducer 40" (Col. 7, 32-33). This modulation is desired to change the optical path length of the fiber in that section of the device. However, any change in optical path length requires a physical change in the length of the path through which the light is traveling. In this case, the light is traveling through the fiber; therefore, in order to enact an optical path length change, the fiber must be stretched or

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compressed by the PZT in order to generate the desired modulation and the desired path length change. As a result, the argument that the PZT merely generates phase modulation with no physical change in the length of the fiber is not persuasive, and the rejection of the corresponding claims stands.

#### ***Allowable Subject Matter***

Claims 6, 30, and 52 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter: The prior art of record, taken either alone or in combination, fails to disclose or render obvious the use of a pulley and anchor system as an actuator in combination with an optical fiber for any desired stretching or compressing of the fiber to generate an optical path length change within the fiber.

#### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event,

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however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


The action is made final because an identical rejection was used from the previous Office Action to reject the claims presented in the applicants' response, and because the claims that are now objected to in this Office Action were objected to because of the amendment to the respective claims.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael A. Lyons whose telephone number is 571-272-2420. The examiner can normally be reached on Monday thru Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Frank G Font can be reached on 571-272-2415. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MAL  
February 19, 2004



Samuel A. Turner  
Primary Examiner